

ANALYSIS AND DESIGN OF A RETAINING WALL

SK.Mahammadhussen, PG student, Department of Civil Engineering, AM Reddy Engineering College,Narasaraopeta,Guntur Dist, Ap, JNTUK

Abstract:

A retaining wall is a structure designed and constructed to resist the lateral pressure of soil when there is a desired change in ground elevation that exceeds the angle of repose of the soil. The most important consideration in proper design and installation of retaining walls is to recognize and counteract the tendency of the retained material to move down slope due to gravity. This creates lateral earth pressure behind the wall which depends on the angle of internal friction (ϕ) and the cohesive strength (c) of the retained material, as well as the direction and magnitude of movement the retaining structure undergoes.

In present project, **analysis** will be carried out on different types of pressures acting on retaining wall due to the back fill viz. Earth pressure at rest, Active earth pressure (when the wall moves away from the backfill), Passive earth pressure (when the wall is pushed towards the backfill).

The retaining wall is **designed** by using the limit-state approach. A number of limiting condition modes are analyzed and in each case, a minimum acceptable factor of safety against their occurrence is specified as the criterion for design. The retaining wall must satisfy the following basic conditions:

- a. The maximum base pressure must not exceed the safe bearing capacity of the soil.
- b. The base pressure must remain compressive over the entire base width (since masonry used in the retaining wall construction cannot resist appreciable tension).
- c. The factor of safety against sliding between the base of the wall and the soil below must not be less than 1.5.
- d. There should be adequate safety against overturning of the wall by rotation about its toe.

INTRODUCTION

AIM

Our aim in this project is to analyse the existing retaining wall located near the premises of Ganges Valley School and to design an economical retaining wall for the backfill portion which is used as a playground for the school.

IMPORTANCE

As the supply of level building sites diminishes, the need to create level building platforms for house construction on sloping sites will increase. Also, on many developed sites there is often a need to level the front

and/or back yards to fully utilize the space for carports, gardens, and playground and entertainment areas.

Cut-and-fill is a common method of achieving level areas but if a batter is used between the level areas so created, a maximum usable area of level ground will not be achieved. Furthermore, on some sites suitable fill may have to be imported and on others spoil disposed of, both of which will add to the cost. The alternative is to use retaining walls. Apart from retaining the soil, retaining walls can also help protect against erosion on susceptible sites.

The requirements of a functional retaining wall include:Structural stability, Durability

against the exposed environment Provision of drainage. Appearance will also usually be important .Concrete retaining walls provide a durable solution that is required of a structure in contact with soil and exposed to constant wetting and drying. Concrete does not rot and is resistant to termites. The wide range of available options ensures that a suitable solution can be found for any situation.

The retaining wall of Ganges Valley School plays a vital role as it supports the backfill which is used as a playground of the School.

CONSIDERATIONS

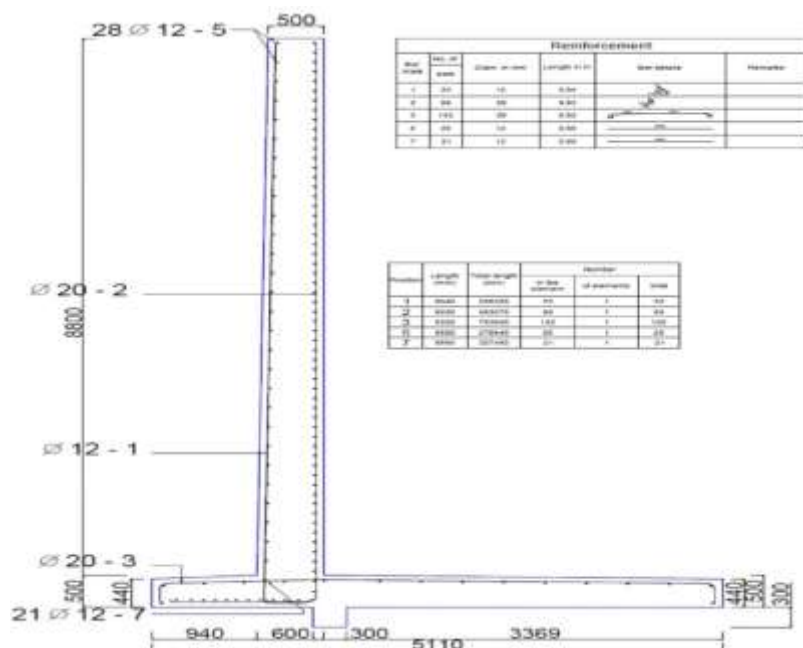
The first step in any retaining-wall project is to check with the local authority to see if planning approval is required. This

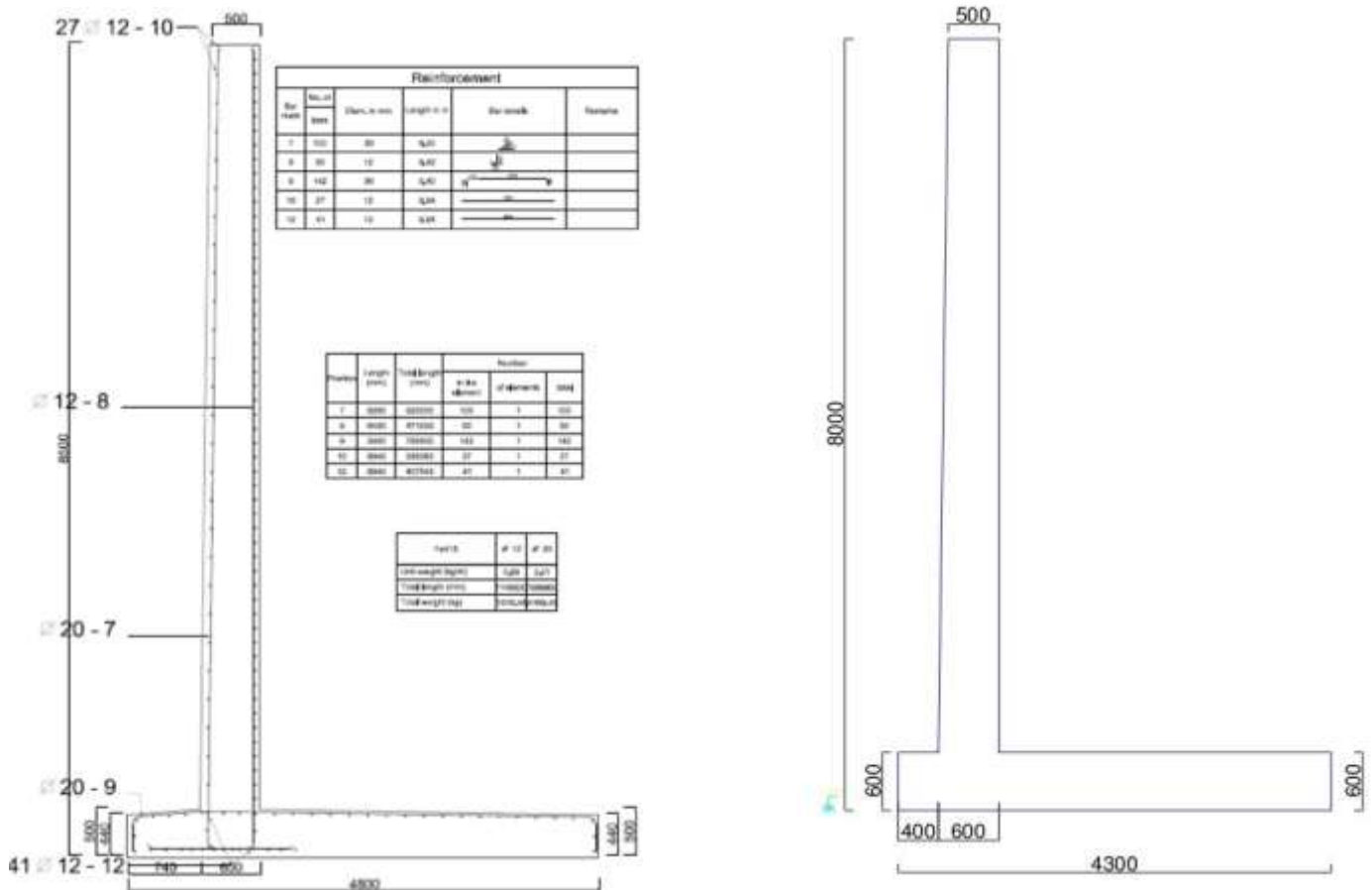
varies between authorities and is usually related to wall height and drainage provisions. Authorities may require drawings showing a site plan and structural details accompanied by a consultant's design certification.

Drainage is an important aspect of any retaining-wall project. Water must not be allowed to build up behind the wall. Retaining walls are designed to resist earth pressures exerted by only the weight of soil retained. These are much less than the hydrostatic pressure exerted by water trapped behind the wall.

The following parameters influence the design of the retaining wall: Sloping land below and/or above the retaining wall Loads above and behind the retaining wall

STRUCTURAL DETAILING:





CONCLUSIONS

Hence by taking different considerations into view design procedure is adopted and in this we adopt the one which is more economic in cost and also which ensure more stability and more service life.

The shear key which is provided in Design 3 greatly increase the frictional force of the retaining wall by passive earth pressure which increase the stability of retaining wall.

All drawings were performed in “AUTOCAD STRUCTURAL DETAILING 2013” along with reinforcement details of retaining wall. By designing the retaining

wall manually and incorporating software for design the project is good example of combined manual and technological Success.

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